NON-PUBLIC?: N
ACCESSION #: 9306290256
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Duane Arnold Energy Center PAGE: 1 OF 6

DOCKET NUMBER: 05000331

TITLE: Reduced Scram Setpoint Due to Induced Noise Signal Causes Automatic Reactor Scram
EVENT DATE: 08/17/92 LER #: 92-013-01 REPORT DATE: 06/18/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Lenny Sueper, Principal Technical Support Engineer TELEPHONE: (319) 851-7365

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: AD COMPONENT: FT MANUFACTURER: I204
B IG IL G080
IG 33 G080
X IG CNVR G080
REPORTABLE NPRDS: Yes
No
No
Yes

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On August 17, 1992, with the plant operating at 100% power, an automatic reactor scram was initiated due to a perceived high average power range neutron flux level. The cause was a noise signal which affected the recirculation flow signals and reduced the flow-biased scram setpoint below the current operating power level.

This revision to the original LER incorporates changes to the corrective actions previously committed to. Specifically, the use of light-emitting

diodes (LEDs) has been approved for use in the control rod indication because of their improved reliability over the the incandescent lamps that failed during this event. Therefore, the previous committment to replace the installed indication quarterly has been changed to a committment to periodically inspect or replace the installed indication with a frequency consistent with the expected service life.

END OF ABSTRACT

I. DESCRIPTION OF EVENT:

On August 17, 1992, with the plant operating at 100% power, an automatic reactor scram occurred at 0718 hours.

An induced noise signal into two ITT Barton model 764 flow transmitters lowered the perceived reactor recirculation flow rate which then lowered the Average Power Range Monitor (APRM) flow-biased scram setpoint below the current operating power level.

Upon receipt of the Reactor Protection System (RPS) actuation due to an APRM upscale trip, all control rods fully inserted. Initial verification of 'all rods-in' was hampered by seventeen (of 89) burned out control rod full-in indicating lamps. Additionally, a single, failed control rod Position Indicating Probe (PIP) reed switch for the full-in overtravel position prevented the Safety Parameter Display System (SPDS) computer from providing an 'all rods-in' display, which operators use as an alternate way to determine control rod position. Based on this lack of complete control rod position information, the Anticipated Transient Without Scram Emergency Operating Procedure (ATWS-EOP) was entered at 0720 hours.

Immediate operator actions per the ATWS-EOP and its associated Operating Techniques were taken at this time. These include overriding the Automatic Depressurization System (ADS) and preventing injection (locking out/tripping) of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems. Following reset of the scram signal, all control rods settled to the 00 (full-in) position from the overtravel full-in position. When this was accomplished, all rods were verified to be full-in via individual rod 00 positions, available full-in indicating lamps and SPDS computer message of all rods in. The ATWS-EOP was exited at this time (0721 hours) and the ADS, HPCI, and RCIC systems were restored to a standby status.

Following the scram, expected core void collapse caused indicated ve

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level to lower below the 170 inch (TAF) low level setpoint to a minimum of 130 inches. All required Primary Containment Isolation System (PCIS) isolations occurred when initiated by the 170 inch low level condition. Reactor level was promptly restored, utilizing normal feedwater flow. Reactor pressure was adequately maintained throughout the transient by the Electro-Hydraulic Controls (EHC) system.

When the reactor mode switch was taken out of the 'Run' position as directed by the scram procedure immediate actions, the 'F' APRM generated a >15% (while not in 'Run') upscale trip half-scram. After the trip was verified to be invalid, the 'F' APRM was bypassed and the half-scram was reset.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv), as actuations of Engineered Safety Features (ESFs).

II. CAUSE OF EVENT

A. Induced APRM Upscale Trip:

Immediately following the event, Operations personnel determined the scram had occurred due to upscale trips on each of the six APRMs in the RPS logic. A review of the neutron flux records shortly thereafter found no evidence of a reactor power increase. The APRM reactor neutron flux upscale setpoint logic was then reviewed to ascertain the cause of the signal.

The APRM neutron flux upscale trip setpoint varies proportionally with reactor recirculation flow by means of a flow-biasing network. The setpoint is automatically adjusted based on recirculation pump flow, with a maximum APRM trip setpoint of 120%. (At 100% recirculation pump output, the trip setpoint is 120%; at lower output levels the setpoint is reduced). A disturbance in the total recirculation flow signal provided to the APRM flow-biasing network could change the APRM upscale setpoint to a value below actual reactor power, which would result in an APRM upscale trip.

Review of data indicated the output signal of two flow transmitters had spiked downward. The two instruments are located next to each other on an instrument rack. Several spikes were noted over a one minute timeframe, beginning before and ending after the scram. A detailed investigation was begun to locate the source of the interference. This investigation included instrument tubing walkdowns, extensive

walkie-talkie radio testing, vibration tests, and several other potential signal sources were checked to determine if a noise spike could be induced. Additionally, electronics contractors were contacted for assistance in determining the source and suggesting potential corrective actions. The only credible source identified was external Radio Frequency (RF), although a specific RF emitter was not identified.

Previous plant data was reviewed and no evidence was located to indicate the remaining six recirculation flow transmitters had ever been subjected to spurious noise signals.

B. 'F' APRM Half-scram:

Troubleshooting found the 'F' APRM 15% (while not in 'Run') scram setpoint potentiometer out of adjustment in the conservative direction. There are many card mounted potentiometers located in close proximity to each other in the APRM cabinets. It is likely that the incorrect potentiometer was adjusted during power operation with the mode switch in 'RUN'. The remaining APRM 15% setpoints were found within specifications.

C. The ATWS-EOP was entered due to a lack of available control rod position indication immediately following the scram. ADS was locked out as specifically directed by the ATWS-EOP. HPCI and RCIC were locked out as directed by an existing Operator Technique. This technique was based on the need to positively control the addition of cold, makeup water to the reactor under ATWS conditions.

III. ANALYSIS OF EVENT:

This event had no adverse effect on the safe operation of the facility. The reactor scram occurred as designed upon receipt of the APRM upscale signals. All control rods fully inserted. Throughout the transient, vessel level and pressure were maintained within safe operating limits. All ESFs functioned as designed. No emergency core cooling systems were initiated in response to the event.

IV. CORRECTIVE ACTIONS:

A. Induced APRM Upscale Trip:

1. Inductors were installed in the affected flow transmitter circuits. Using a handheld walkie-talkie as a source, testing of these RF 'chokes' showed a reduction from pre-installation spikes of 50

milliamps to post-installation spikes of 2.0 or less milliamps.

2. Additional restrictions have been placed on the allowable presence of handheld radios in the location of the susceptible flow transmitters. Except in emergencies, radios will no longer be permitted in the reactor building corner rooms which contain recirculation flow transmitters.

3. The recirculation flow transmitters not involved with this transient will have inductors installed at the next available modification opportunity.

B. 'F' APRM Half-scram:

The 15% (while not in 'Run') setpoint potentiometer was properly readjusted.

Additional labeling to aid personnel in identifying the individual potentiometer functions will be installed by September 30, 1992.

C. ATWS-EOP Entry:

1. The Operating Technique which directed locking out HPCI and RCIC as an initial action upon entering the ATWS-EOP was revised to allow greater operator flexibility to assess the need for limiting positive reactivity addition from the injection of cold water.

2. A preventive maintenance action was initiated to inspect or replace the full-in indication periodically at intervals consistent with the type and expected service life of the lamps in service.

3. The single, failed overtravel-in PIP input to the SPDS computer has been overridden. This action allows the SPDS to accurately represent the status of the remaining 88 control rods. Analysis shows the reactor will remain shutdown under all conditions with the control rod with the highest analytical rod worth fully withdrawn. Entry into the ATWS-EOP with 88 of 89 control rods fully inserted would not be required. Prior to an available maintenance window to repair the failed PIP, guidance has been provided to the operators on the necessary steps required to determine the position of the control rod following a scram.

4. Following several months of evaluation at the site simulator, the plant has approved the use of light emitting diodes (LEDs) as suitable replacements for the incandescent lamps used in the control rod indicators. LEDs offer greater reliability than incandescent lamps.

V. ADDITIONAL INFORMATION:

A. Failed Components

The RF susceptible flow transmitters are ITT Barton Model 764.

The failed PIP is GE part number 79E111G001.

The incandescent light bulbs are GE lamp number 327.

The 'F' APRM is GE manufacturer's number 145C3096RSG002.

B. Previous Similar Event:

LER 89-009 details an event where a transmitting walkie-talkie induced noise into the same flow transmitters involved in this event and caused a reactor scram. Following the 1989 event, general restrictions on the use of radios were implemented.

C. EIIS Codes:

Component codes:

Flow Transmitters - FT

System Codes:

APRMs -- IG
RPS ---- JC
EHC ---- JG
Recirc - AD
HPCI --- BJ
RCIC --- BN

Iowa Electric Light and Power Company

June 18, 1993
NG-93-2190

Mr. John Martin
Regional Administrator

Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License DPR-49
Licensee Event Report #92-013 Rev. 01

Gentlemen:

Please find attached a copy of the subject revision to Licensee Event Report #92-013 Rev. 01, The changes from the original submittal relate to our decision to approve the use of light emitting diodes (LEDS) as suitable replacements for the incandescent lamps installed in the control rod indications and the establishment of a periodic inspection/replacement schedule that is appropriate for the type of indication in use.

Very truly yours,

David L. Wilson
Plant Superintendent - Nuclear

DLW/LS/eah

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